What is claimed is:

1. An electro-thermal field mapping apparatus for scanning a workpiece comprising:

means for generating an optical signal;

an electro-optic field-mapping sensor for receiving the generated optical signal and for generating an output optical signal that is influenced by a free-space electric field associated with the workpiece passing through the sensor;

means for sensing a characteristic of the output optical signal containing electric field information; and

means for compensating the sensed characteristic of the output optical signal containing electric field information that is corrupted by temperature variations.

2. The apparatus of claim 1 wherein the sensor further comprises:

at least one crystal having a predetermined orientation.

3. The apparatus of claim 2 further comprising:

the crystal made of gallium arsenide (GaAs).

4. The apparatus of claim 1 further comprising:

means for scaling relative electric field information to absolute units.

5. The apparatus of claim 1 further comprising:

means for stabilizing electric field phase drift.

6. The apparatus of claim 1 further comprising:

means for filtering an electrical signal proportional to the output optical signal so that electric field information and temperature information are distinguishable.

7. The apparatus of claim 1 further comprising:

means for measuring temperature from the output optical signal.

8. The apparatus of claim 1 further comprising:

means for simultaneously measuring electric field and temperature from the output optical signal.

9 The apparatus of claim 1 wherein:

the means for sensing a characteristic of the output optical signal senses a characteristic that contains temperature related information.

10. A method for scanning a workpiece with an electro- thermal apparatus comprising the steps of:

generating an optical signal;

receiving an output optical signal with an electro-optic field-mapping sensor that is influenced by a free-space electric field associated with a workpiece passing through the sensor changing a characteristic of the sensor and the output optical signal;

sensing a characteristic of the output optical signal; and

compensating the sensed characteristic of the output optical signal that is corrupted by temperature variations.

11. The method of claim 10 further comprising the step of:

providing the sensor with at least one crystal having a predetermined orientation.

12. The method of claim 11 further comprising the step of:

providing the crystal made of gallium arsenide (GaAs).

13. The method of claim 10 further comprising the step of:

scaling relative electric field information to absolute units.

14. The method of claim 10 further comprising the step of:

stabilizing electric field phase drift.

15. The method of claim 10 further comprising the step of:

filtering an electrical signal proportional to the output optical signal so that electric field information and temperature information are distinguishable.

16. The method of claim 10 further comprising the step of:

measuring temperature from the output optical signal.

17. The method of claim 10 further comprising the step of:

simultaneously measuring electric field and temperature.

18. The method of claim 10 wherein the step of sensing comprises the step of:

sensing a characteristic of the output optical signal that contains temperature related information.